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PATENT

Attorney Reference Number 6047-68313-01
Application Number 10/822,113

Amendments to the Specification

Please amend the paragraph beginning on page 1, line 14, as follows:

There has been some recent interest in the use of carbon nanotubes due to their remarkable properties. Researchers have found carbon nanotubes to be stronger and tougher than steel, capable of carrying higher currents than either copper or superconductors, and able to form transistors a few nanometers across. In addition, nanotubes have high thermal conductivity and are stable at high temperatures. E. Lerner, "Putting Nanotubes to Work," *The Industrial Physicist*, pp. 22-25 (Dec. 1999). Further, carbon nanotubes may have a consistent resistance (predicted to be about 6.0 kilohms) regardless of the length of the tube due to the intrinsic characteristics of ballistic transport in such nanotubes. A. Kasumov, "Supercurrents Through Single-Walled Carbon Nanotubes," *Science*, 284, 1508-1510 (May 1999). Currently, the resistance of conventional semiconductor devices varies due to the doping means that are used to produce the desired resistance. Thus, the consistent resistance of a nanotube would be of particular value for semiconductor devices. However, neither the form that particular nanotube semiconductor devices would take nor methods for mass production of nanotube semiconductor devices are currently known or available.

Please amend the paragraph beginning on page 7, line 1, as follows:

A patterning layer 18 is then formed over the nucleation layer 16 and is patterned, developed, and etched such that the areas of the nucleation layer 16 upon which nanotubes 32 are to be formed are exposed (Fig. 2B). The patterning layer 18 may comprise any suitable masking material, such as polymethylmethylacrylate (PMMA). The procedure of Kong et al., "Synthesis of Individual Single-walled Carbon Nanotubes on Patterned Silicon Wafers," *Nature*, 395, 878-881 (Oct. 1998), incorporated herein by reference, may be employed to grow the nanotubes. ~~Kong et al., pattern PMMA on silicon and deposit nanotube growth-nucleating material as a solution.~~ According to Kong et al., PMMA is patterned on silicon, and nanotube growth-nucleating material is deposited as a solution. After vaporization of residual solvent, the PMMA is removed and the resulting "catalytic islands" are subjected to chemical vapor deposition (CVD) conditions for nanotube growth.

Please amend the paragraph beginning on page 7, line 11, as follows:

The nanotubes 22, preferably but not necessarily carbon nanotubes, may be formed, e.g., by plasma state methods or ~~(CVD)~~ CVD. For example, in CVD atoms of the nucleation layer 16 that are exposed to the vapor act to form the nanotubes by attaching themselves to a growing edge of the tube beneath a catalyst cap 28 (Fig. 2C). The nanotubes 22 will grow substantially vertically, i.e., substantially orthogonal to the substrate 12 (Fig. 2C). Further, the nanotubes 22 will grow only where the nucleation layer 16 is exposed. The nanotubes 22 form hollow tubes having a wall thickness of from about 0.6 nm to about 3 nm and an internal diameter of from about 0.6 nm to about > 5 nm. As the nanotubes 22 are formed the exposed portions of the nucleation layer 16 move up with the top portion or upper ends of the nanotubes, forming caps 28 thereon. Patterning layer 18 may then be removed (Fig. 2D).

Please amend the paragraph beginning on page 10, line 13, as follows:

The insulation layer 14 is patterned in a manner as known to those skilled in the art to expose a portion 38 of the substrate 12. The source 17 is formed between the nanotube 22 and the substrate 12 at exposed at 38 as depicted in Fig. 4B (such that the source 17 is connected to external circuitry exposed on the ~~substrate~~ substrate). With reference to Fig. 4C, an isolation layer 20 comprising, for ~~example~~ example, boron nitride or other suitable insulating material is formed.